



Project Fact Sheet

Recycling Chiller Bath Rinse Water In Poultry Processing

BACKGROUND

Food safety considerations in chicken processing facilities require that the bird carcass to be disinfected using chlorinated chilled bath water. After one use the water has to be discarded and a new batch needs to be cooled to 38 degrees Fahrenheit. This requirement makes the process use a large quantity of water and electricity for cooling it. The PIER program provided funds to research and demonstrate the combined use of membrane technologies and ozone for disinfecting to reduce water and electricity use. Besides establishing the technical and economic feasibility, the project was able to receive a clearance from the United States Food and Drug Administration (USDA) to use ozone as a disinfecting agent in food processing.

GOALS

- Reduce the amount of water and electricity used in the chicken processing plant and to reduce related costs.
- Demonstrate that ozone is an effective anti-microbial sanitizer in poultry processing .
- Design, install and operate a closed-loop, ozone-based pilot recycling system at a Petaluma, California poultry processing chiller line.

PROJECT DESCRIPTION

The purpose of this project is to reduce the energy required in poultry processing by demonstrating the feasibility of using ozone water treatment technology to recycle chiller bath rinse water in poultry processing operations.

Presently, poultry processors use chlorine chemicals to disinfect the chiller-bath step and must discard the 0.5 gallons of chilled, chlorinated rinse water used per bird to meet USDA sanitary regulations.



BENEFITS TO CALIFORNIA

- Achieve estimated net energy savings of 3 million kWh per year of energy (about 12 watts/bird) in the 250-million-bird-per-year poultry processing industry in California.
- Improving the environmental and public health costs/risks of California residents by avoiding the use of chlorine disinfectants.



OUTCOMES

This study evaluated three protocols approved by USDA for processing chicken on a pilot scale for marketing. Water and energy management practices of the plant were also studied and conservation strategies were proposed.

- Plant evaluation of pre-wash of chickens with ozonated water indicated that ozonated water is as effective as chlorinated water in this application. A well enclosed continuous in line “in- and-out” pre-wash station supplied with ozonated water used with adequate ventilation on a commercial process line is recommended.
- Filtration of commercial chiller overflow water through an ultrafiltration membrane rated at 10,000 mwco met all USDA requirements for maximum use of reconditioned chiller water, including, light transmission and reduction in microorganisms. Ultrafiltration using spiral membrane modules rated at 10,000 mwco can be economically attractive and meet all the regulatory requirements.
- Pilot chiller bath water at 38° F maintained at 2 to 4 ppm ozone using 1/4 gallon of makeup water per bird remained clear and microbial counts were equivalent to a commercial 3-stage chlorinated chiller. A final rinse of birds emerging from the chiller using tap water containing 6 to 8 ppm ozone further reduced microbial counts. Potential oxidative degradation measured by TBA and fatty acid profiles did not differ significantly from commercial chickens processed with chlorine. Sensory evaluation by expert panels and at-home food service judged ozonated chickens equal to commercial chickens from the same line processed with chlorine.
- At present the plant consumes about 7 gallons of water per bird in the processing. Ultrafiltration of chiller water overflow, ultrafiltration of pre-wash water and coarse filtration of evisceration water are suggested to reduce the water consumption to 4.5 gallons per bird. Recovery of chiller overflow results in substantial energy savings.

PROJECT STATUS

Complete, Final Project Report submitted to Energy Commission.

For More Information

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